

Application No. 10/087,566

REMARKS

Claims 25-72 are pending. By this Amendment, claims 26, 29, 30, 33, 36, 38, 42, 48, 50, 54, 60, 62, 66, and 72 are amended, and no claims are canceled or added.

Claims 26, 30, 36, 38, 42, 48, 50, 54, 60, 62, 66, and 72, and the specification, are amended to correct a typographical error. In particular, the spelling of silicon (Si) has been corrected. Claims 29 and 33 have also been amended to correct minor typographical errors. No new matter has been added and no narrowing amendments are intended.

Claim Rejections – 35 U.S.C. § 102

Claims 25 and 36 stand rejected under 35 U.S.C. § 102(e) as being anticipated by U.S. Patent Application Publication No. 2001/0017770 to Copetti et al. (hereinafter “Copetti”). These rejections are respectfully traversed.

“A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference.” MPEP § 2131 (citing *Verdegaal Bros. v. Union Oil Co. of California*, 814 F.2d 628, 631, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987)). Claims 25 and 36 are not anticipated by Copetti because Copetti does not teach that a Vickers hardness of the metal alloy layer is not less than 25 and not more than 40, as is recited in claim 25, from which claim 36 depends.

The Office Action mailed November 11, 2004, to which the present Office Action refers, asserts the following: “Since Copetti discloses the module comprises the same structure as claimed, the same structure will inherently have the same properties as claimed such as having the Vickers hardness of not less than 25 and not more than 40.” Office Action of November 4, 2005, page 3. Applicants respectfully disagree with this assertion.

As previously submitted, Copetti does not teach that a Vickers hardness of the metal alloy layer is not less than 25 and not more than 40. In fact, Copetti is silent as to any

Application No. 10/087,566

Vickers hardness. "To serve as an anticipation when the reference is silent about the asserted inherent characteristic, such gap in the reference may be filled with recourse to extrinsic evidence. Such evidence must make clear that the missing descriptive matter is necessarily present in the thing described in the reference, and that it would be so recognized by persons of ordinary skill." MPEP § 2131.01(III) (citing *Continental Can Co. USA v. Monsanto Co.*, 948 F.2d 1264, 1268, 20 USPQ2d 1746, 1749 (Fed. Cir. 1991)). No extrinsic evidence has been provided in any Office Action to date, and the Examiner's assertion to the contrary is not evidence.

"Inherency, however, may not be established by probabilities or possibilities. The mere fact that a certain thing *may* result from a given set of circumstances is not sufficient." *Continental Can* at 1269 (emphasis in original). "[I]f the crucial property or characteristic of the reference is not *necessarily* implicit in the reference's disclosure, then the principles of inherency do not apply and a reference without either inherent or explicit disclosure of each and every element of the claim cannot anticipate the claim." *In re Runion*, 989 F.2d 1201, 1993 WL 18490 (Fed. Cir. 1993) (emphasis in original).

The present application as filed shows that some mainly aluminum compositions can fall outside of the claimed Vickers hardness range. Refer, for example, to the Comparative Examples provided on pages 26-32 of the present application as filed. Further, Copetti teaches in Embodiment 1 (column 3, ¶ 0069 – col. 4, ¶ 0070) and Embodiment 2 (col. 4, ¶¶ 0072 and 0073) an electrically conducting layer of Al doped with 4% Cu. Referring to Comparative Examples 5 (pages 28-29) and 8 (pages 30-31) of the present application as filed, a composition having 5% Cu is well outside of the claimed Vickers hardness range of 25 to 40. The Vickers hardness in each of Comparative Examples 5 and 8 is 68. Interpolating these results with 1% and 2% Cu compositions as described in other examples provided in the present application as filed (e.g., Examples 14 and 15), an estimated Vickers hardness of Al doped with 4% Cu on an

Application No. 10/087,566

aluminum nitride substrate as described in Copetti is about 51, which is also well outside of the range recited in claim 25.

Thus, even assuming Copetti's module is the same structure as that recited in claim 25, which Applicants respectfully submit it is not, the recited Vickers hardness of not less than 25 and not more than 40 of claim 25 is not inherent to Copetti's structure.

Applicants acknowledge the "Response to Arguments" on pages 3-4 of the Office Action mailed November 1, 2004, and note the following. Two references were submitted with the Amendment filed March 30, 2005, as "evidence that a Vickers hardness may vary according to a process of hardening a material" Amendment of March 30, 2005, page 10. The Office Action correctly states that the processes disclosed in the references are not the same processes disclosed in the present application, and that the alloy compositions disclosed in the references are not the same alloy compositions. If the processes and alloys were the same, the references would potentially be anticipatory. Again, the references were submitted only as general evidence that a Vickers hardness may vary according to a process of hardening a material.

The "Response to Arguments" also asserts that "the present application only recites that the Vickers hardness varies according to the composition of the alloy material," referring to Tables 1-5 of the present application, and that "[t]here is no evidence in the specification to show that the Vickers hardness of the alloy material varies according to a process of making the alloy material." Applicants respectfully submit that a Vickers hardness of an alloy may vary according to a process of hardening (cf. "making" in the Office Action), even if the compositions are the same.

As is generally known to those skilled in the art, and noting that these processes are only given as examples and may or may not be applicable to the present application, the qualities or characteristics of materials may be altered by tempering ("To harden or strengthen (metal or glass) by application of heat or by heating and cooling," as defined by *The American*

Application No. 10/087,566

Heritage Dictionary, 4th ed. (2000)), annealing ("1. To subject (glass or metal) to a process of heating and slow cooling in order to toughen and reduce brittleness. 2. To strengthen or harden." *Id.*), and other processes and treatments.

The Office Action of November 1, 2004, provides further support by stating the following on page 4: "Boutin also teaches that the aluminum alloys [have] *improved mechanical characteristics* during and after the aluminum alloys[] exposure to elevated temperature Therefore, it would have been obvious to one of ordinary skill in the art to use the aluminum alloy as taught by [Boutin] in Ning's aluminum layer in order to *improve[] mechanical characteristics during and after the aluminum layer['s] exposure to elevated temperature*" (Emphasis added.) Regardless of Boutin's teachings with respect to the present invention, wherein Applicants respectfully disagree with the obviousness rejections for reasons set forth below, the Office Action supports Applicants' assertion that qualities or characteristics of a material may vary by more than a composition of the material.

Further, and contrary to the assertion in the Office Action, the specification as filed does show that the Vickers hardness of the alloy material may vary according to the process of "making" (Office Action of June 7, 2005, at page 4) the alloy material. This is recognized, for example, in the Examples, Comparative Examples, and Tables provided on pages 7-39. Examples 9 and 20 each disclose the same composition of 98% Al and 2% Mn and an aluminum nitride ceramic substrate board. Example 9, however, teaches direct bonding and a Vickers hardness of 30, while Example 20 teaches bonding by brazing and a Vickers hardness of 31. Compare also Examples 2 and 6 (Vickers hardnesses of 30 and 31, respectively); Examples 14 and 25 (30 and 31, respectively); Examples 15 and 26 (32 and 33, respectively); Examples 16 and 27 (32 and 33, respectively); Examples 17 and 28 (32 and 33, respectively); and Examples 18 and 29 (34 and 35, respectively).

Application No. 10/087,566

Therefore, at least for the reasons set forth above, Copetti does not teach a Vickers hardness of the metal alloy layer is not less than 25 and not more than 40, as is recited in claim 25 with the other elements of the claim. Accordingly, Applicants respectfully request that the § 102(e) rejection of claim 25 and claim 36, which depends from claim 25, be withdrawn.

Claim Rejections – 35 U.S.C. § 103

Claims 25-28, 30-32, 35, and 36 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 5,965,193 to Ning et al. (hereinafter "Ning") in view of U.S. Patent No. 4,222,774 to Boutin et al. (hereinafter "Boutin"). Claims 29, 33, and 34 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Ning and Boutin and further in view of U.S. Patent No. 6,153,025 to Auran et al. (hereinafter "Auran"). Claims 49-52, 54-56, 59, and 60 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 6,297,549 to Hiyoshi et al. in view of Ning and Boutin. Claims 53, 57, and 58 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Hiyoshi, Ning, and Boutin, and further in view of Auran. Claims 37-40, 42-44, 47, 48, 61-68, 71, and 72 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 6,122,170 to Hirose et al. (hereinafter "Hirose"). Claims 41, 45, 46, 65, 69, and 70 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Hirose and Boutin and further in view of Auran. These rejections are respectfully traversed.

Each of claims 25 and 37 claims an insulating substrate board, wherein the Vickers hardness of the metal alloy layer is not less than 25 and not more than 40, in combination with the other elements recited in each respective claim. Each of claims 49 and 61 claims a power module, wherein the Vickers hardness of at least said one metal alloy layer is not less than 25 and not more than 40.

Application No. 10/087,566

None of Ning, Boutin, Auran, Hiyoshi, and Hirose teach or suggest either an insulating substrate board, as claimed in claims 25 and 37, wherein the Vickers hardness of the metal alloy layer is not less than 25 and not more than 40. The cited references also do not teach or suggest a power module, as claimed in claims 49 and 61, wherein the Vickers hardness of at least said one metal alloy layer is not less than 25 and not more than 40. Even if the cited references teach or suggest the structure recited in the claims, which Applicants respectfully submit they do not, the references do not inherently teach or suggest the same properties, such as the recited range of Vickers hardness, at least for the reasons set forth above with respect to Copetti. Further, none of Ning, Boutin, Auran, Hiyoshi, and Hirose disclose any Vickers hardness.

Therefore, claims 25, 37, 49, and 61 are allowable at least for the reasons set forth above. Claims 26-36, 38-48, 50-60, and 62-72 variously depend from claims 25, 37, 49, and 61 and are therefore also allowable. The rejections of claims 26-36, 38-48, 50-60, and 62-72 are traversed but not expressly argued in view of the allowability of the underlying base claim(s).

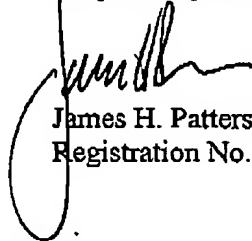
Application No. 10/087,566

Conclusion

In view of the foregoing, it is submitted that this application is in condition for allowance. Favorable consideration and prompt allowance of the application are respectfully requested.

The Examiner is invited to telephone the undersigned if the Examiner believes it would be useful to advance prosecution.

Respectfully submitted,



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